[*All Rights Reserved.*]

ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 47.] NOVEMBER. [1890.

CLXXV.—LIBERIAN COFFEE.

About 1872 Sir Joseph Hooker had his attention directed to a large berried coffee which occurred wild in Liberia but had been introduced into cultivation at the Gold Coast and Sierra Leone.

From the latter colony Sir John Pope Hennessy, then Governor of the West Africa Settlements, sent nine plants to Kew in 1872. Unfortunately they arrived all dead; but through the aid, about the same time, of Mr. C. S. Salmon, then acting Administrator of the Gold Coast, 480 seeds were obtained from the Rev. T. B. Freeman, who had a small plantation of the coffee on the Secoom River near Accra.

The plants raised from these seeds at Kew were the first grown in this country. In the following year Mr. Bull, the well-known nurseryman of Chelsea, imported living plants. In 1874 and 1876 larger supplies of seed were obtained at Kew direct from Liberia, through

LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY EYRE AND SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.

And to be purchased, either directly or through any Bookseller, from
EYRE AND SPOTTISWOODE, East Harding Street, Fleet Street, E.C., and
32, Abingdon Street, Westminster, S.W.; or
ADAM AND CHARLES BLACK, 6, North Bridge, Edinburgh; or
HODGES, FIGGIS, & Co., 104, Grafton Street, Dublin.

1890.

Price Twopence.

the kind agency of Mr. James Irvine, of the firm of James Irvine & Co., of Liverpool. The plants were distributed from Kew to tropical botanical gardens throughout the Empire, but only in experimental quantities. The Kew Reports from 1872 to 1882 contain continuous notices of its distribution and progress. Meanwhile the firms of W. Bull, of King's Road, Chelsea, and James Irvine & Co., of Liverpool, had raised the plant from seed on a commercial scale, and had distributed it to the various coffee-growing countries of the world.

Mr. W. P. Hiern, in a paper on the African species of the genus *Coffea* in the *Transactions of the Linnean Society* (Second Series, Botany, vol. i., pp. 169–176), remarks that "All the species most "valuable for economic or commercial purposes are confined to Africa "or are of African origin." The well-known *Coffea arabica* is indigenous in Abyssinia, on the slopes above the Victoria Nyanza and in Angola. It is cultivated in Arabia, and often occurs there spontaneously, though whether it is really indigenous or an escape from cultivation is doubtful. Liberian coffee has been found wild at Sierra Leone, in Liberia, and in Angola. It is, therefore, confined, as far as we know, to the West Coast. The name *Coffea liberica* was given to the species by Mr. Bull in his trade catalogue for 1874. It was conveniently adopted by Mr. Hiern in his paper, who first published a detailed description and figure of the plant in preference to an unpublished manuscript name in the Herbarium of Afzelius.

There were two respects in which Liberian coffee attracted great attention. While the ordinary or so-called Arabian coffee plant is only suitable for cultivation in the tropics in hilly and mountainous districts, Liberian coffee was indigenous to the plains and forests of western tropical Africa, and was found to "grow equally well in the immediate "neighbourhood of the sea and at considerable distances from it." The cultivation of coffee had been seriously crippled in India and Ceylon. The Kew Report for 1873 remarks (p. 5) that, "As the "coffee disease (a fungus, *Hemileia vastatrix*) and the Borer (a "beetle) continue their ravages in the coffee plantations of Madras and "Ceylon, it is much hoped, though scarcely to be expected, that the "Liberian species may prove less liable to the attacks of the insect or "fungus, or either of them."

The cultivation of Liberian coffee did not, however, at first realise the expectations formed of it. It was said to exhibit no especial immunity from disease. The bean was thought to be coarse in flavour, and it found but little favour in the London market. The berries were also found difficult to clean by the planters. This is explained in the following extract from a previous notice in the Kew Bulletin for 1888, p. 262:—

> The "cherries" of Liberian coffee do not become soft and pulpy when ripe, but remain hard and fibrous. Hence it has been found difficult to husk the beans, as the machinery found suitable for preparing Arabian coffee is not applicable to the Liberian coffee. Again, the "parchment" skin in the latter is tough and woody, and the labour and per-centage of waste entailed in "cleaning" is increased, while the actual market value is less.

At the present moment the tide of opinion in the planting world has set somewhat in favour of Liberian coffee.

Its cultivation has been prosecuted with considerable success in the Straits Settlements (*see Kew Bulletin*, 1888, pp. 261–3; 1890, pp. 107, 108). Beans cleaned on the spot have realised as much as 75*s.* a cwt. It is believed that the undoubtedly strong flavour of the new beans has

not been found objectionable in the United States, to which a good deal of the present produce of Liberian coffee probably finds its way. The practice in America is to keep raw coffee for even a considerable number of years, as the flavour is believed to improve in consequence. It is possible that with this treatment Liberian coffee would be more appreciated than on its immediate consumption.

Planting is, however, a practical business, and theoretical considerations, however well founded, must give way to the actual experience of planters. The following account of a fresh experiment is therefore reproduced, as it is written in a spirit at once moderate and impartial. It is borrowed from the pages of the Ceylon *Tropical Agriculturist* for July of the present year, into which in turn it was copied from the *Madras Mail* of May 10.

Some 15 years ago I received a couple of Liberian plants from a number presented to a Planters' Association by Government. These had come out to the country, I believe, from Kew direct, in a Wardian case. Planted in a back garden and almost unnoticed and uncared for, they grew broad and high till now they are about 26 feet and have apparently no intention of stopping. In the evil report soon after prevailing regarding Liberian coffee, I supposed there was nothing in it till at length I began to notice that the trees were bearing very well, and that there was no trace of leaf disease. Then I planted out 200 or 300 seedlings in a new clearing along with Arabica, and these, now seven or eight years old and in a more sheltered position than their parents, have done even better. Planted 10 by 10 over Arabica they have now run up to 16 or 18 feet, all exactly of one type, and are bearing exceedingly well; the crop on them for this season cannot well be taken at less than three pounds of clean coffee per tree. The Arabica underneath them has suffered frightfully from fungus regularly every year, yet I challenge anyone to find a sign of it on them. A few of the old leaves turn yellow and tumble off, as was the natural way of our old staple before the days of leaf disease, as I well remember before 1868. We know that Liberian coffee will grow at the sea-level; the ones above referred to are at 2,500 feet in sheltered bamboo land: whether they will do well at higher elevations remains to be seen, but as far as I can see I am satisfied, and only regret that I did not do eight years ago what I am doing now, viz., plant Liberian all over my clearing *with the Arabica* and let the best win. To sum up, the points of difference between Liberian and Arabica I find as advantages:—

1. That it does not get fungus, or only in such a way that the health of the tree is in no way affected.
2. That it is a tree, not a bush, running up to 30 feet in height before 15 years old, and in consequence is not injured by drought.
3. That judging by the trees in evidence, and the way they go on growing, and by the fact that they do not come into bearing till four or five years old, this variety may be taken as much longer lived.
4. That it is a heavier bearing tree when once fairly started; those in evidence now yielding 10 to 20 cwts. per acre, calculating on the clean coffee yielded, and admitting that only some 700 trees to the acre can be grown instead of at least double that number of the old kind.
5. That being a deep-rooted plant, it is not affected by drought, while a very slight shower is quite sufficient to bring out and

set the blossom; which, moreover, has the further advantage of fading and falling off within the day of its opening, so that it is hardly possible that it can be injured by rain or hail as is so often the case with the delicate Arabica blossom. Even in the very driest season, when the other plants appear on the point of destruction, these look cool and green and not turning a leaf.

6. That the cost of cultivation is comparatively little. There is *no pruning to do* beyond pulling off the suckers for two or three years to prevent the tree from running up into too many stems, the crop is carried on the same wood (and extensions of it) year after year, and there is, therefore, no old wood to cut out. The shade of a thick, tall tree like this, where they pretty well cover the ground, would effectually prevent weeds from becoming troublesome, and as the roots are deep down, the debilitating effects of weeds even if they did grow, would be very little felt.
7. The berries (of the size of a walnut) remain firmly fixed on the tree for *many weeks* after they are ripe enough to pick; eventually they fall off, and may be gathered off the ground. In the case of a scarcity of labour this might be an advantage.

Against these good points we may set the following :—

1. That this species gives very little return till at least the fifth year, while in low-lying districts some return is got from Arabica in the second year.
2. That the value in the London market, from a sample lately sent home, is about 10 per cent lower than that of ordinary coffee.
3. That in districts under the south-west monsoon, whose flowering season is in March and April, the crop instead of beginning to ripen in October and finishing in January or February takes a whole 14 months to ripen. The flowering season is the same as the other, but though some berries will turn ripe in the following April much of it will not be ready to gather until July. Thus, the tree carries two crops at the same time, and all mixed together in the same branches. Sometimes at the end of the spring we may see at the same time the crop of the previous season as large as plums, and partially turning red, the crop of the current season the size of peas, and a further sprinkling of the curious eight-petalled, heavily scented blossoms as large as the palm of a child's hand. All these mixed together among the large dark, glossy leaves, give the tree a most rich and handsome appearance.

There are now one or two points about which some information may be of interest.

Picking.—There is no difficulty about this; a notched bamboo enables the cooly to get up among the branches, and he then strips off all that is ripe, or nearly so (taking care not to rip off the small berries), dropping it all on the ground, and collecting afterwards into baskets.

It takes four bushels of these huge cherries to make one of parchment (instead of two as with Arabica), but even so, the fruit being so large, a cooly can pick quite twice as much as of the other, and the cost per ton of clean would be much the same.

Curing.—I have seen advertisements of special pulpers made in Ceylon for Liberian coffee, and have no doubt that they are as effective as they are represented. Anyone growing a quantity of this coffee would have to employ machinery.

I have tried experiments on a small scale with my cherry, and found that it was no use to pass the stuff through an ordinary disc pulper (set

of course very wide), because the husk never (at this elevation) gets soft enough to squeeze out below the chop but rolls up into a hard ball and comes out with the parchment in front; and I found that when the chop was set wide enough to allow the husk to pass, the bean went with it. Moreover the work was so hard that four coolies were completely tired out in pulping two bushels! Then I found that the simplest way of getting at the parchment was to put it up in heaps in the pulping house *to rot*. This may seem barbarous, but the colour of the clean coffee so treated was quite as good as some treated in the ordinary way, indeed the parchment envelope of the bean is so thick and strong that it completely protects it from injury from heating. Moreover this kind of coffee will carry nothing but a dead whitey-green colour no matter how the curing may be done. If allowed to dry in cherry some heavy peeler might perhaps break it up, but it seems to me as hard and tough as the very best road metal, and I much doubt whether a coffee-curing firm would undertake it on the usual terms. As regards the drinking qualities of this variety, I can safely say that no one who had not previously been told would know that he was not drinking the pucka article, the same quantity of powder goes further and I cannot notice any inferiority of quality. Unsuspecting guests have often said "May I have another cup of this excellent coffee?" and they usually look somewhat surprised when told what it was. If you try to sell it in the bazaar whole and clean (looking something like date stones in shops) natives decline to buy it. "This one kind bad imitation coffee" they will say, but if you smash it up and mix a little dirt with it they will take it readily, and never find out the difference.

Planting.—Owing to the seedling throwing out a strong, deep, tap root, something like that of a jack tree, I am inclined to think that when a plantation has to be made it would be better to have the pits made ready by May, and then to put one or more seeds in each pit as early in the south-west monsoon as possible, so that the seedlings may get established before the end of the north-east monsoon in December. But if not grown to any great size they can be lifted with a little special care from nurseries in the ordinary way. Considering the fact that Liberian coffee does not come into bearing till two or three years after the other, it may probably be a wise plan for one going in for its cultivation to pit his clearing 4 by 4 and to plant Arabica, afterwards putting in the giant kind down every other row, making them thus 8 by 8. The Liberian is much too robust to take any notice of its little friend, while by the time it has come into bearing you may safely assume that the Arabica has given what it can in maiden crops, and unless heavily manured has already made arrangements for returning to a better world where there is no fungus.

The following miscellaneous extracts from correspondence and letters received at Kew since 1882 will serve to bring the history of the cultivation of Liberian coffee down to a more recent date:—

Extract from a Report dated 7th April 1883 on Agricultural Experiments in the Mergui District during the year 1882–83 by Captain J. Butler, the Deputy Commissioner.

Liberian coffee has exceeded my most sanguine expectations of its success. As far as vigorous growth can be a criterion, nothing more could be desired. Over 1,000 of the plants that were at the end of last year only 2 feet high are now 5 to 6 feet high, having made 3 to 4 feet growth in one year; the stems are strong, firm, and healthy, throwing out boughs and leaves: the latter are of enormous size, being

18 inches long and 8 inches broad. In fact, the Liberian coffee is to Arabian what the Assam tea is to China; the former grows to the size of a small tree, whereas the latter is only a shrub.

A number of the Liberian coffee trees came out into blossom in January, and a good many have set into fruit; it takes a twelvemonth to ripen, and so we shall expect our first berries to be ready for gathering about next December; but the first crop is always a light one, and as only some of the plants threw out blossom we cannot expect any great return this year; but the power of the plant to produce fruit at all in its third year should, one would think, give it an immense advantage over the Arabian, which does not come on until its fourth or fifth year.

Extract from a Letter from Mr. J. J. Coles Hardinge, Rangoon, dated 10th June 1884.

The Liberian coffee plants you sent to the Agri-Horticultural Society some years ago have thriven wonderfully well. From the plants in the Garden, about 10,000 seedlings have been raised, and have been distributed over the province, viz. :—Tavoy, Mergui, Taung-ngu, Prome, and Arracan hill tracts; plants of this coffee may now be said to be seen *everywhere*. It has taken very well here. Several private gentlemen have begun planting it out (on large areas of suitable ground) in the suburbs of Rangoon.

Extract from a Letter from Dr. H. A. Alford Nicholls, F.L.S., Dominica, dated 24th September 1884.

Owing to the hurricane of September last year I lost nearly the whole of the crop and most of the trees were thrown down. However, they were soon raised and tied to stakes firmly planted in the ground, and most of the trees recovered in a few months. The trees appear to be very hardy, and the wood of the stem and roots is exceedingly hard and tough. This is fortunate for the cultivation of the plant in these places visited by hurricanes; for, if the wood were soft or brittle, most of the trees would have been broken off at the crown. Indeed, in a few instances the larger trees were broken in this manner, but their large mass of branch and foliage was exposed to the full blast of the wind, and as the tap root is very long, the trees gave way near to the ground. In no case was one uprooted. The line of fracture was irregular, each bundle of fibres showing, as it were, a separate tearing asunder. The trees are now loaded again with berries, and at this time a small secondary flowering is taking place. For the convenience of picking the berries, I have had the trees topped at 5½ feet from the ground. The leaves still resist the blight, and nothing could be more luxuriant than my Dominica Liberian coffee, notwithstanding the fact that it is but little more than a year since the plantation was devastated by a hurricane.

Extract from Letter from Mr. E. H. Edwards, Seychelles, dated 1st July 1885.

Liberian coffee does fairly well at sea level, but at a higher elevation than 100 or 150 feet it is futile to plant it; above this the leaves appear to be attacked with a species of black bug, and the trees are very slow in growth. I do not think this industry will ever be promoted to any great extent, the quantity of suitable land being so small. It also suffers from *Hemileia vastatrix*.

Extract from Letter from Mr. G. S. Jenman, F.L.S., Superintendent, Botanic Gardens, British Guiana, dated January 1886.

Liberian coffee does better than anything else here, and produces sufficient seed for propagating purposes, but even that, hardy as it is, suffers much in the dry seasons, and would, as the free and healthy growth of the rainy seasons clearly shows, do better in a climate more generally humid.

Extract from Report on the Government Plantation at Mergui, by Mr. C. W. Palmer, Deputy Conservator of Forests, South Tenasserim Circle, dated 17th May 1886.

There are now in hand 1,348 bearing trees, two having been destroyed by white ants. From these 1,348 trees the following coffee was obtained:—332 lbs. of coffee in the husk, 200½ pyis of coffee in berry; of the 332 lbs., 112 lbs. were sown in the plantation nurseries, 30 lbs. were made over to the Deputy Commissioner, Mergui, to be sent to the exhibition at Edinburgh, the remainder is in my possession.

The whole of the coffee in berry was made over to Mr. Watson, the planter, in exchange for some tea seedlings. The coffee trees have not flowered as well this year as they did last, however all the trees are looking healthy, and show no signs of leaf or other disease. There are also 2,461 seedlings on hand, many of which will come into bearing next year. Altogether 678 seedlings were distributed from those seedlings which had already been planted out; the remainder of the seedlings distributed were one year old seedlings from nurseries.

I have received several applications for seedlings this year, and am, I believe, to receive more. Mr. Morrow, the American missionary here, is going to make his Karens try the cultivation. This kind of coffee will grow, I feel certain, anywhere nearly in this and the Mergui districts.

Extract from a Report on the Botanic Gardens, British Guiana, for the year ending 31st December 1885.

The best coffee to grow in this country is, I believe, without doubt the Liberian, though the Arabian, which was once cultivated on a large scale, might likewise be profitably grown. An unfavourable report on the quality of Liberian in comparison with Arabian coffee was sent out from the Colonial Exhibition. No one should, however, I advise, be discouraged by this report. In despite of it, all circumstances con-

sidered, Liberian coffee is, I believe, the best to cultivate here. It is best adapted to our low sea level altitude, which is a very important consideration, it is more robust, and a heavier cropper than the Arabian, and it possesses the great merit that the berries hang after they are ripe persistently on the branches, awaiting the cultivators' convenience to pick them; whereas the Arabian berries drop as soon as they are ripe; and the price obtained for the Liberian coffee is as much as is obtained for average Arabian coffee. The great advantage of the fruit hanging till it can be picked may be judged from the fact that the opposite condition in Arabian coffee had a good deal to do with the coffee industry lapsing here fifty years ago. The supply of labour after emancipation was precarious, and coffee cultivators could not obtain it when their crop was ripe at a price that would leave any margin of profit. Hence the fruit fell to the ground and rotted, and the enterprise had to be abandoned. Labour, to be sure, is more abundant now, but the element of security possessed by the Liberian coffee under the contingency of bad weather or scarce labour is a chief feature in favour of that species. As regards its quality: in Ceylon I understand no distinction is made between it and the Arabian in sending it to market, and it is not kept separate. To combine it with Arabian in equal parts is probably the best way of using it, but many people regard it as excellent used alone.

In Java and the Malay States the cultivation of Liberian coffee appears to be far in advance of what is being done in Southern India, and the produce is a regular export. As stated in the *Kew Bulletin* for 1888, p. 261, the plan of fermenting the berries before they are pulped has been for some time adopted in Java.

This notice may conclude with the following extract from the General Report on planting by Mr. John F. M. Cock, Superintendent Government Plantations, Perak, published in the Perak Government Gazette for September 19th last. It will be seen that Mr. Cock while recommending the planting of Liberian coffee still gives the palm to the Arabian :—

As matters stand at present anyone proposing to open land must make sure of the terms on which he will be allowed to employ labour. He must next visit India and see what prospects he has of getting labour. My advice emphatically is, commence in the low country. In the first year cut out blocks less rather than more than you expect labour sufficient to work, fell about five acres sufficient for nurseries and buildings only, clear up thoroughly, burning everything except the very largest trees. Plant rapid-growing trees in the neighbourhood of buildings to shade the ground, and use quicklime freely all over wherever decaying matter is. Leave a good belt at least two chains wide round this five-acre block of standing timber. Estimate for a small cattle establishment from the very first. They are a wholesome thing about the place, coolies like them, the bullocks save your coolies in transport, and milk is necessary for children and ailing coolies. When buildings are well in hand and nurseries making a good show, the planter must pay India another visit to see his agents are doing their work, and that he will not be disappointed with labour. Then let him commence felling with caution. Leave selected trees for shade, plant others, and plant Arabian coffee. Three years later let him plant the fields up with Liberian coffee. By the time he has reaped two crops from the Arabian trees, the Liberian trees will be well grown and demanding the removal of the Arabian coffee. When a base to work

from has been well established let him open clearing on the hills for a permanent Arabian coffee estate. If at the end of ten years a man with a good command of capital has 500 acres of coffee in the low country, and 250 acres of Arabian coffee free of weeds, well drained, with good buildings and spouting laid from top clearing to permanent store on the Liberian estate, the work is well done.

The advantage Arabian coffee possesses over the Liberian variety is too well known to require confirmatory evidence. So far as I know, no Arabian coffee has been planted by Europeans in the Straits in the low country, therefore it may be well to state there is nothing original in the idea. Arabian coffee has been and is being successfully grown in the Dumbera Valley in Ceylon, which, though about 1,000 feet above sea level, has a drier climate than this country, the temperature being as high as the temperature of the low country here. I see the cultivation of Arabian coffee recommended under shade in India, and the fact that coffee in India under shade escaped the ravages of leaf disease longer than coffee in Ceylon has been attributed to the shade trees on the Indian plantations. I have put three years as the time for planting Liberian amongst the Arabian coffee; I am inclined to think the fifth year would be soon enough. The experienced planter would, however, have fields of both coffees and plant up the Arabian only when it was showing signs of exhaustion. Shade would be dispensed with when Liberian coffee is well started.

CLXXVI.—COLA NUT.

(*Cola acuminata*, R. Br.)

Cola nuts are the seeds of a tree, *Cola acuminata*, R. Br. belonging to the natural order *Sterculiaceæ*. The tree is native of west tropical Africa, extending from Upper Guinea to the Congo. It is now introduced into most tropical countries and is naturalised in the West India Islands and other parts of tropical America.

A very full description of the cola plant, *Cola acuminata*, R. Br. is given in Oliver's *Flora of Tropical Africa*, Vol. I., page 220. It is a tree 20 to 30 feet high with cylindrical smooth branches. The petioles are from 1 to 3 inches long, thickened at the apex; the leaves are 3 to 6 inches long, 1 to 2 inches broad, somewhat leathery, tapering at the base, oblong acuminate, entire or slightly sinuous and revolute at the margins. The flowers are numerous, polygamous [some flowers male, some female, and others hermaphrodite on the same plant], and arranged in terminal and axillary cymose panicles. In the male flowers the column is slender much shorter than the calyx, bearing a ring of ten two-lobed anthers. In the hermaphrodite flowers the anthers are sub-sessile in a ring surrounding the base of an oblong five-celled ovary. The fruit normally consists of five pods or follicles, sometimes fewer by abortion, each one sessile or sub-sessile, oblong, obtuse or rostrate, coriaceous or woody, smooth or tuberculate, 3 to 6 inches long and 2 to 3 inches thick. The seeds vary from 5 to 12 in each pod; they are oblong, obtuse, or tetragonal; the testa (or seed covering) is purplish and cartilaginous. The number of the cotyledons varies from two to five; they are thick, horny, flat on the inner surface, rounded on the other.

Professor Oliver adds "this tree furnishes the cola nut so much "esteemed by the natives for their bitter flavour, and which is said to "enhance the taste of whatever is eaten after them. It varies very much

" in the size and form of the leaves and flowers, the appearance of the " pods, the colour of the seeds, and even the presence of from 2–5 " separate and distinct cotyledons. Whether these variations depend " upon cultivation or not, it is not easy to decide; whether or no, " numerous intermediate gradations between the different forms may be " traced. The number of cotyledons varies even in seeds taken from " the same pod. Barter says that the nuts with four cotyledons are not " so much prized as those with two in the native markets."

Amongst the negroes of West Africa cola nuts occupy a high position both in the social and dietetic economy of their daily life. " With the majority of the aboriginal races populating that vast extent " of territory comprehended between Senegambia to the north and " Angola south of the Equator, cola nuts have from time immemorial " been held in inestimable value, and their virtues so highly prized " that their employment has become an indispensable and permanent " luxury. Within the last few centuries, however, their use has been " even still more extensively diffused, and to such a degree as to excite " a large commercial intercourse to spring up between the coastal " districts, and the regions of Central Africa and the Soudan."* In the interior of tropical Africa no doubt the cola passes into the hands of Arab traders, from whom it finds its way through trade channels and at constantly enhanced prices to the Indian Ocean. This led Mr. C. S. Salmon, who was at one time Acting Administrator of the Gold Coast, and subsequently Chief Civil Commissioner in the Seychelles, to suggest that the cola nut might be cultivated in eastern countries (Kew Report, 1881, p. 15). From 1880 onwards it has accordingly been propagated at Kew and steadily distributed to botanic gardens in every part of the Empire where its cultivation is likely to meet with success.

It may be observed that in early times cola nuts were supposed to be used merely as a means for rendering water sweet and palatable when drunk before or after meals;† but it was soon evident that they possessed other properties and that they had been selected as if by intuition on account of the property which undoubtedly they did possess of supplying a necessary stimulus to those who have to endure an occasional or prolonged deficiency of animal food; for in West Africa, as in other parts of the tropics, the flesh of animals is often scarce and difficult to procure. The use of cola nuts to render water palatable may be compared to that of olives in European countries. The latter are well known to enhance the flavour of whatever is eaten after them. On the other hand, the power said to be possessed by cola nuts of staying the cravings of hunger and of enabling those who eat them to endure prolonged labour without fatigue is comparable to that ascribed to the leaves of the Coca plant of Ecuador and Peru. In fact cola nuts in Western Africa play the same part that *Erythroxylon Coca* does in South America.‡

More than two centuries ago Dapper announced that the seeds of the kola "as experience teacheth, eaten in the evening hindreth

---

* On the Cola nut of tropical West Africa, by Dr. Daniell. Pharm. Journ., [2] vi. 450.

† In tropical countries the only available supply of water is often thick and muddy. The seeds of many trees in different parts of the world, which contain mucilaginous or astringent matter, are used to clarify the water by rubbing round the sides of the vessel containing it. The principle of their action has never been investigated properly, but it is probably more physical than chemical. *Strychnos potatorum*, the Indian clearing nut, affords one of the best known examples.

‡ Kew Report, 1880, p. 15.

sleep."* This fact was confirmed by Dr. Daniell in 1865, and it led him to suspect that kola nuts contain some constituent analogous to caffeine or theine. Theine was soon after obtained by Dr. Daniell from cola nuts, and his discovery was confirmed by Dr. Attfield in a paper read before the Pharmaceutical Society in January 1865.† Dr. Attfield found that "a quantitative determination showed that the proportion "of theine present in dried cola nuts is 2 per cent. Coffee contains "from ·5 to 2·0, and tea from ·5 to 3·5 parts in 100. . . . . "
". . . . The presence of theine in cola nuts points to their "analogy with coffee, tea, and two other similar but less common substances—Paraguay tea (*Ilex paraguayensis*) and Guarana (*Paullinia "sorbilis*). Infusions of one or other of those vegetable products are "used in beverages probably by three-fourths of the human race, and "each contains the same active principle—theine. To these must "now be added cola nuts. . . . . The common astringent principle tannin which occurs in coffee to the amount of 5 per "cent., and in tea to 15 per cent., and which gives to tea and coffee "beverages their pleasant rough taste, is entirely wanting in cola "nuts.‡ . . . . . cola nuts then in the dry state "somewhat resemble coffee, but differ in not containing tannin, in "possessing but little fatty matter, and in the presence of much "starch."

A further and more detailed examination of kola nuts was made by E. Heckel and F. Schlagdenhauffen in 1883. An abstract of their paper is given in the *Pharmaceutical Journal* [3], XIV., 584, which furnishes a very complete account of the botanical, chemical, and therapeutical aspects of the subject. It is stated that "among the vegetable "products of African soil there is perhaps none more interesting and "valuable than those which, under the various names of cola, gourou, "ombéné, nangoué, and kokkorokou, are used in articles of consumption throughout tropical and equatorial Africa is equivalent to tea, "coffee, maté, and cacao." The true cola, sometimes known as female cola, is yielded by *Cola acuminata*, whereas what is known as male cola or bitter cola is probably derived from a species of Guttiferæ (*Garcinia Kola*, Heckel). The tree is said to commence to yield crop about its fourth or fifth year, but it is not until about its tenth year that it is in full bearing. A single tree will then yield an average of 120 pounds of seed annually. This agrees very fairly with the results obtained in the West Indies. Mr. W. Fawcett, F.L.S., speaking from Jamaica experience, states that "the cola tree is propagated by "seeds, and will begin to bear after four or five years. There are trees "near the Botanic Garden, Castleton, which were planted over 50 years "ago, still in perfect health, and bearing fruit regularly. The trees "should be planted about 20 feet apart, which would give 108 trees to "the acre. The trees grow about 40 feet in height. Those near Castleton produce from 500 to 800 pods each crop. If each pod contains on "a moderate calculation four seeds, and if we say 50 seeds to a quart, "then a tree with 600 pods will give 50 quarts of nuts twice a year, or "100 quarts per tree per year. A quart of dry nuts will weigh a little "over 1¼ lb.—125 lbs. a tree. A tree in full bearing, and under careful "cultivation, would probably produce 150 lbs. of nuts a year."

---

* Ogilvey's Africa, p. 494.

† On the Food-value of the Cola-nut.—A new source of Theine by John Attfield. Pharm. Journ. [2], vi. 457.

‡ On the other hand Heckel and Schlagdenhauffen found tannin in cola nuts to the extent of 1·618 per cent.

Messrs. Heckel and Schlagdenhauffen state that—

"The collection [of the crop] is conducted with great care, and is made by women. The seeds are removed from the husk and freed from the episperm. In order to maintain their value among the negroes it is necessary to keep them in a fit state and in good condition. They are, therefore, carefully picked over, all damaged and worm-eaten seeds being removed, and the sound seeds are then placed in large baskets, made of bark and lined with 'bal' leaves (*Sterculia acuminata*, Car., or *S. heterophylla*, Beauv. ?), the seeds are heaped up, and then covered over with more 'bal' leaves, which, by their thickness, resistance, and dimensions, contribute not a little to the preservation of the seeds by keeping them from contact with dry air. Packed in this manner the seeds can be transported considerable distances, remaining free from mould for about a month, during which time it is not necessary to submit them to any treatment in order to preserve them fresh beyond keeping the 'bal' leaves moist. But if it be desired to keep them beyond that time the operations of picking and re-packing have to be repeated about every 30 days; the seeds being washed in fresh water and fresh 'bal' leaves placed in the baskets. The baskets usually contain about 3 cwts. of seeds. It is in this condition the 'kola' is sent into Gambia and Goree, where the principal dealings in the seeds are carried on."

"In Gambia they are sold in the fresh state to merchants travelling with caravans into the interior, who dry them in the sun and reduce them to a fine powder, which is used, mixed with milk and honey, by the tribes of the interior to make a very agreeable, stimulating, and nourishing beverage. It most frequently arrives at Sokota and Kouka in the Soudan and Timbuctoo, where large sales of the seeds are made in the fresh condition; from the Soudan markets it is carried by caravans to Tripoli, and from Timbuctoo into Morocco. As might be expected the value of the kola increases as it makes its way into the interior of Africa, and some of the tribes furthest removed from the sea pay for the dry powder with an equal weight of gold dust."

The chemical composition of cola nuts has also been very fully worked out by Heckel and Schlagdenhauffen. They give the results as follows: caffeine 2·348 per cent., theobromine 0·023 per cent., tannin 1·618 per cent. These results differ in some respects from those already quoted as obtained by Attfield, and especially in the recognition of the presence of theobromine and tannin. The proportion of caffeine is higher than that observed in any coffee or, except in rare instances, in tea.

The dietetic value of cola nuts is no doubt primarily due to the caffeine contained in them. The presence of theobromine indicates their alliance with cacao, to which they are also connected by botanical affinities, as both *Cola* and *Theobroma* belong to the same natural order, *Sterculiaceæ*. The small quantity of tannin (which approximates to caffeo-tannic acid in its composition) contained in cola nuts as compared with tea and coffee, may be an advantage from a dietetic point of view, as also the absence of the large proportion of fat which it is necessary to remove from cacao beans during the process of manufacture.

These circumstances have naturally suggested the use of cola nuts as a beverage substance, and efforts have been made during the last few years to prepare from them products similar to chocolate and the dry powdered cocoa of commerce. The use of cola nuts as a beverage substance was apparently well known in the West Indies for some time

before the subject attracted attention in this country. In the Annual Report of the Director of Public Gardens and Plantations, Jamaica, for the year ending 30th September 1882, the following note appeared on the subject :—

Cola nut.—" This tree, which has lately attracted considerable attention, is common in many parts of the island under the name of Byssi, and seeds can be obtained, in quantity, if required for commercial purposes. Dr. Neish, of Port Royal, to whom I am indebted for a note on this product, remarks, 'what enhances the value of kola 'nuts at the present time is the fact that citrate of caffeine,—a medicine 'now much employed for the relief of sea-sickness, megrim, and other 'nervous complaints,—can be readily obtained from these nuts, for the 'reason that the nuts contain more caffeine than coffee berries; and 'in the kola nut the caffeine is in the free or uncombined state. These 'nuts are likely to take their place in the market as furnishing a 'nutrient and stimulant beverage. Rich in the active principle of 'coffee, containing also a large proportion of theobromine, the active 'principle of cacao, these nuts, in addition, contain three times the 'per-centage of starch contained in chocolate; and, moreover, they also 'contain less fat, so that, in addition to stimulant and nutritive pro-'perties, there is the probability that a chocolate prepared from them 'will more readily agree with delicate stomachs.'

" The suggestion made by Dr. Neish that a chocolate might be prepared from the kola-nut seems a very appropriate one, for both the cacao and cola belong to the same natural order (*Sterculiaceæ*), and the habits and characteristics of the two are very similar. They both affect low, warm situations, and in view of the probable demand for kola nuts, attention might very well be given to their cultivation."

The cola nut is very plentifully distributed throughout Jamaica; having probably, like the Akee (*Blighia Sapida*) and other West African plants, been introduced by slave ships. (*See* Kew Report, 1882, p. 19.)

In the Annual Report of the Director of Public Gardens and Plantations, Jamaica, for the year ending 30th September 1883, the following further note was given :—

Cola nut.—" This interesting plant is largely distributed in the island, and its cultivation is being extended in the hope that ultimately cola nuts may become a recognised article of commerce. The tree is hardy and easily established, and there would be no difficulty in supplying large quantities of the nut every year. Locally the nuts are used as a stomachic and tonic. They are said to have effected very remarkable cures in dyspepsia and allied disorders, and are used for this purpose in the same manner as cacao or chocolate. This is prepared by grinding the dry cured nut into a powder and mixing with boiling water, sugar, and milk. Some people use the cola nut regularly at breakfast in this manner, and consider it superior to everything else of the kind."

" Seed nuts are to be obtained in the months of June to September, and if intended for shipment should be planted in soil. To cure the nuts for export they only require to be taken out of the pods and subjected to careful drying until quite firm and hard. The process, however, requires to be thoroughly done, owing to the thickness of the cotyledons, in order to prevent mouldiness on the voyage."

The trade in cola nuts has been hitherto chiefly confined to the West Coast of Africa, where the nuts have been utilised for distribution,

in the fresh state, amongst tribes living outside the actual area of production. For instance, in the year 1879, according to a report furnished by Acting Administrator Berkeley (*Report* of the Royal Gardens, Kew, 1880, p. 14), there were imported into the Gambia from Sierra Leone 743,000 pounds of cola nuts, and the trade was rapidly increasing.

Of late years a demand has arisen in this country for cola nuts for purposes of experiment and for converting into a preparation similar to chocolate and cocoa. How far this demand is likely to be permanent it is impossible to say. According to a correspondent in the city "there has been a great rise in the price of cola nuts during this "year, I believe from about 4*d.* per pound to 2*s.* and 2*s.* 6*d.* per "pound." Further, he adds, "the rise in the price of cola nuts is "owing to the action of a merchant here, who has bought up all he "can to make into cola chocolate."

The home of the cola plant is West Africa, but large quantities of the nuts could at any time be shipped from Jamaica and Grenada and other places in the West Indies, and the only difficulty hitherto has been the low price offered for them in this country. No doubt the present extraordinarily high prices will stimulate shipments from all parts of the world, and the market will be so fully supplied that prices will naturally fall. From the trade reports given in the *Chemist and Druggist* the present phase of the market in cola nuts is shown as follows:—

"Oct. 4th, 1890. Kola nuts still continue to rise in value, and from 2*s.* 2*d.* to 2*s.* 3*d.* per pound has been paid this week for fair dried seeds."

"October 18th, 1890. Kola nuts have much advanced this week, and in Liverpool, we believe, up to 2*s.* 9*d.* per pound is now asked for good dry seeds, although we understand that an arrival of about 50 packages has taken place. At to-day's auction one barrel very good bright West Indian kolas was put up and sold with strong competition at the extraordinary price of 2*s.* 5*d.* per pound."

In a speech by Sir Alfred Moloney, K.C.M.G., the Governor of Lagos, on the occasion of the opening of steam communication with Brazil, August 13th last, the following remarks occur:—

"In view of the rapid passage that will now be the case, compared with the sailing ship runs, the kola trade ought to admit of considerable expansion, especially when it is known that there is a large and growing demand in Brazil, and that what costs here 2*s.* 6*d.* realises there 6*s.*"

The following correspondence is interesting, establishing the actual existence of the trade:—

FOREIGN OFFICE to ROYAL GARDENS, KEW.

SIR, Foreign Office, October 3, 1890.

I AM directed by the Marquis of Salisbury to transmit herewith, for your information, copy of a Despatch from Her Majesty's Consul at Bahia containing a report on the use and properties of the kola bean.

I am, &c.

The Director, Royal Gardens, Kew. (Signed) T. V. LISTER.

[Enclosure.]

MY LORD, Bahia, September 6th, 1890.

I HAVE the honour to bring under your Lordship's notice, in the event that it may prove useful to Her Majesty's War Office, the great

powers of endurance and strength in lifting heavy loads and transporting them to long distances in this tropical climate, possessed by the West African negroes in these parts, which personal observation and conversations with them, and West African traders who visit this, enables me to attribute to the free use of the kola bean, which I learn is now being introduced into the French army after research, study, and experiments made at Marseilles by Dr. Heckel, Professor of Science, at the Medical Academy thereat. The West African carriers at this port, who use kola and carry the bean wrapped in banana about their person, are, as a whole, not, physically speaking, superior men to the Brazilian negro, and yet, the African, through constantly masticating kola, can endure labour and fatigue which no Brazilian carrier can withstand, and where, for instance, it takes eight Brazilian negroes to carry a load with difficulty, four African porters carry it cheerfully, almost always, even though ascending a hill, singing and chanting the whole time as they trudge along, but never without a bit of kola bean in their mouths, and as the discharging of vessels is paid by weight as a rule, the African gangs, who have less hands, earn twice as much, and while they hoard and save, the Brazilian porter lives from hand to mouth, spending in rum, under the impression that it tends to strength, three times what the African lays out daily in kola beans, which are not intoxicating and in no way injurious, act as a nutritive, quench thirst, are not stimulant, and yet produce vigour and freshness. I have myself had a bag of sugar weighing 80 kilos (179 lbs. English) refused by a young healthy able-bodied native negro porter, who could not so much as move it, carried away with ease by an aged African negro, after biting a piece of kola nut, and transported a distance of 4 miles in an hour and a quarter without once taking it off his head, and I could cite many similar instances.

Kola comes here from Lagos, and is never very fresh. It is best when or soon after gathered; each bean is sold here from 2*d.* to 3*d.*, according to freshness. A bit of the nut is kept in the mouth and masticated gradually until it is swallowed. I have little doubt that this kola bean is well known to Her Majesty's Government, but having frequently extolled its merits in my private correspondence with Mr. Wyndham at Rio de Janeiro, his Excellency suggested my reporting on it to your Lordship for the information of Her Majesty's War Office.

I transmit, in charge of Captain Spooner, of the Royal Mail Steam Packet Company's steamship "Clyde," a dozen kola nuts, from a parcel recently imported by a negro trader from Lagos.

I have, &c.

(Signed) GEO. ALEX. STEVENS,
Consul.

The Marquis of Salisbury, K.G.,
&c. &c.

It may be added that the attention of the Government of India has been drawn to the use of cola nuts "as a stimulant to men who may be called upon to undergo prolonged exertion." The needful information has been supplied from Kew upon the subject.

In addition to cola nuts, sometimes called female cola, the seeds of *Cola acuminata*, there are "nuts" used in West Africa for similar purposes known as "bitter cola" or male cola. These latter, as already supposed, have been identified by Dr. Masters, F.R.S. (*Journal of Botany*, vol. iv., 1875, p. 65), as evidently those of some member of the natural order *Guttiferæ*. "The materials are not sufficient, however,

" in the absence of flowers, to allow of the certain identification of the " genus, though it would seem most probable that it is a species either " of *Garcinia* or of *Xanthochymus*. I have not been able to match " the leaves with those of any West African Guttifer in herbaria, " though they are very like those of *G. floribunda*." In 1885 Heckel proposed the name of *Garcinia Kola* for the tree yielding bitter cola, founded on specimens of branches, leaves, and fruits received by him from various places in tropical Africa. Heckel appears to have received no flowers, so his botanical description does not carry us beyond what was already known from the investigations of Dr. Masters in 1875. Heckel states that "upon chewing [the male or bitter cola] seeds a " strongly bitter, astringent, and yet aromatic taste is perceptible, " which is quite different from that of the true cola, and approaches in " its aromatic flavour that of green coffee; it is this aromatic flavour " that is esteemed by the negroes . . . . . probably the seeds " owe their properties to the resin they contain, which is slightly " stimulant. . . . . An examination of fresh male or bitter " cola nuts for caffeine gave negative results."